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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## Reduction of Litter and Shrub Crowns by Planned Fall Burning of Oak-Mountainmahogany Chaparral

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Burning during periods of low-fire hazard appears to offer promise as a means of altering the density, stature and, to some extent, composition of chaparral stands in central Arizona. Fall burning in particular permits one winter and spring growing period to elapse before high-intensity summer rains occur. This greatly reduces risk of excessive soil movement.

A study on the Sierra Ancha Experimental Forest near Globe, Arizona, has provided some preliminary data on litter and crown reduction by such planned fall burning (fig. 1). The study area is in chaparral type composed of shrub live oak (Quercus turbinella Greene) and true mountainmahogany (Cercocarpus montanus Raf.) at an elevation of 5,300 feet. Annual rainfall at Sierra Ancha headquarters,



Figure 1.--This extensive topkill resulted when treated chaparral was burned during low-hazard conditions.



3/4 mile east and 200 feet below the study area, averages 24.98 inches. Summer rainfall for the 4-month period preceding burning was 7.87 inches in 1961 and 2.07 inches in 1962. This represents 92.6 and 24.4 percent of the long-time average, respectively.

Shrubs were dried prior to burning.--Shrubs were chemically desiccated to permit burning when fire would not ordinarily penetrate into untreated, high-moisture-content vegetation. Treatment was applied on 50-, 100-, and 200-foot wide strips, respectively, on three small drainages. The strips were run generally on the contour. Those designated for burning in September 1961 were sprayed by helicopter with 3 pounds of Dinoxol<sup>2</sup> in 10 gallons of diesel oil per acre, 6 weeks prior to burning.

On the 1962 strips, 4 weeks prior to the September burning, a mist blower was used to apply 1.5 pounds of Dinoxol in 10 gallons of diesel oil per acre. Little difference in final leaf-drying effects was noted as a result of the change in method of application and reduced dosage. Moisture content of heavily treated shrub live oak leaves on the sprayed strips dropped to 11.0 and 12.9 percent in 1961 and 1962, respectively, while the moisture content of untreated leaves was 90.5 and 93.8 percent.

Litter reduction varied with burning conditions.--Less than one-third of the litter was actually consumed by the September 1961

burn, while approximately half was burned in September 1962:

	1961	1962
Litter:		
Preburn tons per acre	6.8	4.6
Percent reduction	28.6	51.1
Shrub canopy:		
Percent preburn	60.8	67.1
Percent reduction	92.6	94.5

Nevertheless, in 1961 the fire was hot enough to topkill most of the shrubs (fig. 1). The greater litter and crown reduction in 1962 may have resulted from the higher burning conditions that year:

	1961	1962
Relative humidity, percent	41-62	28-42
Air temperature, degrees	65-73	77-93
Drought index	57 (low)	87 (high)
Rate of spread	5-10 (low)	10 (low)

<sup>1</sup>Plant Ecologist and Research Forester, respectively, located at Tempe, in cooperation with Arizona State University; central headquarters are maintained at Fort Collins, in cooperation with Colorado State University. Glendening passed away December 30, 1963.

<sup>2</sup>"Dinoxol" is a mixture of 2 lbs. per gallon (acid equiv.) each, of the butoxy ethanol esters of 2,4-D and 2,4,5-T. It is produced by the Amchem Corporation of Ambler, Pa. Trade names and company names are used for the benefit of the reader and do not imply endorsement or preferential treatment by the U. S. Department of Agriculture.